



## Short Communication

## Predicting health behaviors with economic preferences &amp; locus of control

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## ARTICLE INFO

## Article history:

Received 14 August 2013

Revised 12 October 2014

Accepted 18 October 2014

Available online 24 October 2014

## Keywords:

Health economics

Experimental economics

Time preferences

Risk preferences

## ABSTRACT

We present new results on the relationship between health behaviors and experimental measures of time and risk preferences. In contrast to recent findings in the economics literature, we find no evidence of a link between time preference and self-reported health behaviors and outcomes such as smoking and BMI. We also introduce evidence that internal locus of control—a psychological construct that refers to the tendency to attribute to oneself control over outcomes—explains significant variation in health behaviors, in models that also include traditional measures of risk and time preference.

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## 1. Introduction

From a policy standpoint, it is important to know whether differences in health behavior reflect differences in individual preferences, inadequate information, or other durable sources of variation among inputs. The economic literature on investment in health has focused on the role of time and risk preferences in explaining health behavior. A growing empirical literature has related experimentally measured time preferences to behaviors and outcomes such as smoking (Bradford et al., 2014; Chabris et al., 2008; Harrison, Lau, and Rutström, 2004; Khwaja, Sloan, and Salm, 2006; Sutter et al., 2013), drinking (Bradford et al., 2014; Sutter et al., 2013), cocaine and heroin abuse (Kirby and Petry, 2010), higher BMI (Golsteyn, Grönqvist, and Lindahl, in press; Komlos, Smith, and Bogin, 20014; Sutter et al., 2013), and higher demand for medical screening tests (Picone, Sloan, and Taylor, 2004) and vaccines (Chapman and Coups, 1999). There is also some evidence of a relationship between risk aversion and reduced smoking and drinking (Anderson and Mellor, 2008; Khwaja, Sloan, and Salm, 2006; Barsky et al., 1997), greater seat belt usage (Anderson and Mellor, 2008), greater demand for medical screening tests (Picone, Sloan, and Taylor, 2004), and lower BMI (Sutter et al., 2013, Anderson and Mellor, 2008).

Yet evidence on the associations between preferences and health behaviors is not consistent across these studies and the magnitudes of the effects found are often small. In this paper, in addition to traditional measures of myopia and risk aversion, we consider the predictive power of qualitative survey measures of time and risk preference and of locus of control (LOC)—a psychological construct referencing the relative degree to which one attributes control over one's life to oneself versus external factors—in explaining variation in health behaviors.

Survey measures of preferences have the practical advantage of being very quick and simple to implement. In addition, previous studies have demonstrated associations between survey measures of time preference and experimentally elicited discount rates (Kirby, Petry, and Bickel, 1999) and a strong relationship between survey measures of risk and behavioral outcomes (Dohmen et al., 2011; Stango and Zinman, 2009). We find that our survey measure of risk aversion appears to capture different characteristics than our incentivized, lottery-based measure and that the two measures are significantly related to different health outcomes. Surprisingly, we do not find clear evidence of a link between time preference and health behaviors, with either the survey measures or the incentivized choice measure, and we address what this null result can tell us about sensitivity of finding this link to procedural details.

Our motivation to explore LOC as a predictor of health behavior is based on evidence in the psychology literature of a link between perceived control and health outcomes and evidence in the economics literature linking similar measures to outcomes in other domains. In particular, psychologists have linked internal

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LOC to lower likelihoods of risky health behaviors such as smoking cigarettes or being overweight and greater likelihood of behaviors such as using seatbelts and contraceptives and receiving preventive dental care (Wallston and Wallston, 1978). Economic work on the relationship between non-cognitive abilities and financial and labor market outcomes also suggest the importance of perceived control for decisions affecting future outcomes. Heckman, Stixrud, and Urzua (2006) found that a measure of non-cognitive ability (consisting of internal locus of control and self-esteem) was an important predictor of future wages and work experience in the National Longitudinal Survey of Youth (NLSY79). Using data from the NLSY79's Child and Young Adult sample, Kuhnen and Melzer (2014) found that self-efficacy in adolescence—a construct similar to LOC which measures belief in one's ability to change future outcomes—was related to loan delinquency during adulthood.

To date, measures of perceived control have rarely been incorporated into economic studies using individual preferences to predict health behaviors. Chapman and Coups (1999) did measure flu-specific locus of control but did not find a significant relationship between locus of control and demand for the vaccine. However, in the study reported here, which includes a general measure of LOC as well as both incentivized and qualitative measures of time and risk preference, internal LOC is strongly associated with both increased preventive and potentially risky health behaviors. This finding suggests that economists interested in predicting health behaviors and outcomes should consider a broader set of individual characteristics than risk and time preferences and that LOC in particular may be a useful measure to include.

## 2. Methods

In order to explore the relationship between different measures of time and risk preference, LOC, and health behaviors, we analyze self-reported health behavior and experimentally elicited preferences from 144 students enrolled in a large public university's Masters of Public Health program. The experiment was conducted as part of a class, with no students opting out of participation. The subjects are predominantly female (115/144) and range in age from 21 to 55 with a median age of 27. Just over half are non-Hispanic white (74/144), with 37 Asian or Pacific Islander, 14 Hispanic, 9 Black, and 10 self-described "other." Subjects answered survey questions about health behavior and LOC and both survey and financially incentivized questions eliciting risk and time preferences.

Our standard risk and time preference measures are financially incentivized and elicited as follows: time preference "myopia" is indicated by preference for a smaller amount of money at a sooner date over a larger amount at a later date. We measure myopia using responses to the following question: "Would you rather have (A) \$10 right now (i.e., at the end of this session), (B) \$12 in one week (7 days) from now, (C) \$14 in one month (30 days) from now, or (D) \$16 in three months (92 days) from now?" The distribution of responses to this question is presented in Fig. 1. Risk aversion is an index that sums choices between risky and less risky gambles, for example: "Would you rather have a one-half chance of \$8 and a one-half chance of \$11 or a one-third chance of \$7 and a two-thirds chance of \$14?" The risk aversion index includes responses to four questions of this type (questions 1–4 in Appendix). It also includes one question that captures risk aversion in the domain of losses (question 5 in Appendix): "For this question imagine that you are given \$20 to start with. Would you rather lose (i.e., have to pay us back): one-half chance (50%) of \$0 and one-half chance of \$17, or certain (100% chance) of \$11?" These questions were incentivized, albeit somewhat weakly, by randomly selecting one

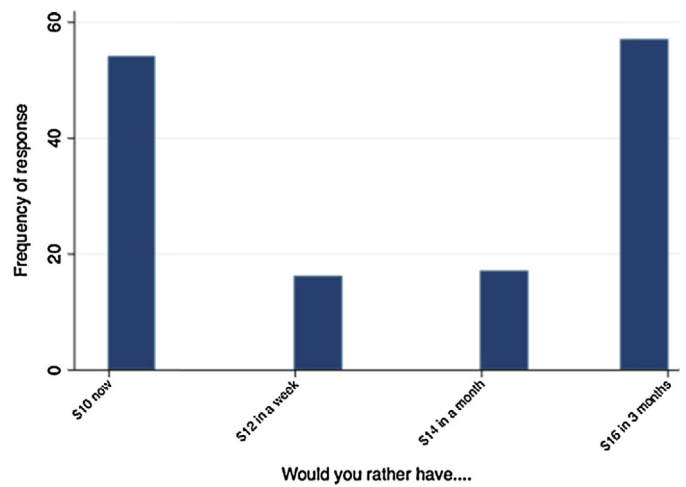


Fig. 1. Distribution of responses to the question eliciting myopia.

question and one subject who was paid at the end of the session based on their decision in the chosen question. Participants were informed of this incentivization design prior to the survey.<sup>1</sup> We also include a cognitive measure reflecting whether responses to the two questions over risky outcomes are consistent with one another, since these two questions actually present the same outcomes in different frames.

The survey-based measures of myopia and risk aversion came from the following questions: degree of agreement with the statement "I enjoy the thrill of physically dangerous sports/activities" functions as a qualitative survey measure of low risk aversion, and agreement that, "I enjoy the moment and don't worry about the future," provides a qualitative measure of time preference myopia.<sup>2</sup>

Our measure of internal LOC is a subject's agreement (on a 5-point scale) with the statement: "I have control over my life." We chose this one-question measure rather than a standard scale from psychology such as Rotter's (1966) 29-item locus of control scale in the interest of testing measures that would be easy for researchers to include in any study. In addition, we were more interested in this study in finding measures that predict health behaviors than in isolating the relationship between the psychological construct of LOC and health.

The outcome measures analyzed are based on 14 self-reported health behaviors and outcomes. Eight questions elicited self-reported frequency of engaging in a given activity (never, occasionally, once a week, more than once a week, or once a day or more). These activities were taking vitamins, flossing your teeth, exercising (for at least 30 min), eating fast food, smoking cigarettes, having unprotected sex, drinking alcohol, and feeling depressed or anxious. Four questions asked respondents to report how strongly they agreed or disagreed with a given statement. The statements were that they: "usually eat healthy food", "almost always wear a seat-belt," "go to the doctor/dentist as often as I should," and "tend to get along with my family." In addition, subjects were asked to

<sup>1</sup> We dropped two additional questions intended to measure risk and time preferences (question 10 and bonus question in attached survey) because exploratory factor analysis indicated that they were not driven by common factors with either the other risk related questions or the other question related to intertemporal choice.

<sup>2</sup> We dropped another question initially intended as a qualitative measure of risk aversion that asked for agreement with the statement, "If I had a disability, I would choose to undergo surgery, even if it were very risky, rather than have to live with it for the rest of my life." We determined that this was not a good measure of risk aversion due to potential confusion with attitudes toward disability.

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